

Zero Retries issue 0136 2024-01-26

Zero Retries is an independent newsletter promoting technological innovation that is occurring in Amateur Radio, and Amateur Radio as (literally) a license to experiment with and learn about radio technology. Now in its third year of publication, with 1200+ subscribers.

About Zero Retries

Steve Stroh N8GNJ, Editor

Jack Stroh, Late Night Assistant Editor Emeritus

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Web version of this issue - <https://www.zeroretries.org/p/zero-retries-0136>

Request To Send

Commentary by Editor Steve Stroh N8GNJ

Hamvention 2024, Ho!

Hamvention 2024 in Xenia, Ohio, USA countdown - ~~49~~ ~~48~~ ~~47~~ 16 weeks!

Amateur Radio Meetings Ought to be About... Radio!

I'm an accidental [Board member of the Mount Baker Amateur Radio Club](#) and thus I'm part of the planning for future meetings of the club, so now I'm paying a bit more attention to the relevance of Amateur Radio clubs and their meetings. Thus the following two mentions combined in my mind:

Donald Rotolo N2IRZ commenting on Zero Retries 0135 (emphasis added):

You know, when I go to the chess club, *we play chess*. At the bridge club, *we play bridge*. At the beer brewing club, we don't brew, but *we do sample and comment on members' beers*. But at the ham club, *all we do is talk*. A recent topic at the meeting was "how to prepare for being a SK". Wow, that really brought the kids in.

Ham clubs *need to play radio at their meetings*. Solder fumes should be common. How to use a multimeter. And so on...

Combine that with this quote I've been citing for practically the entire life of Zero Retries:

The Universal Purpose of Ham Radio is to have fun messing around with radios.

Bob Witte K0NR

Very soon, this will be *my* primary metric of how useful / fun / interesting / relevant an Amateur Radio group or associated meeting is:

Do we... play with RADIOS... at the meeting?

If *we aren't playing with radios* at an Amateur Radio meeting, we (Amateur Radio) are not making use of the singular, unique advantage that we have over every other technical hobby and associated meetings - *we Amateur Radio Operators can play, knowledgeably, with radios* - and have fun with them.

If, as N2IRZ says, *we're just talking*, then we're doing it wrong.

Kay Savetz K6KJN is the Newest Zero Retries Pseudostaffer

For their mostly unsung contributions behind the scenes of many small assistances as I'm writing Zero Retries, and making invaluable, unique Amateur Radio content available to the world again via Internet Archive's [Digital Library of Amateur Radio & Communications \(DLARC\)](#), and their monthly articles on What's New at DLARC, Kay Savetz K6KJN is now a Zero Retries Pseudostaffer.

Thank you Kay!

73,

Steve N8GNJ

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FCC Docket 16-239 Reply Comments Concluded

By Steve Stroh N8GNJ

The Reply Comment phase of FCC Docket 16-239 formally concluded on Monday, 2024-01-22. For my part, after reading the Reply Comments, I decided that I didn't have anything more profound to say as a Reply Comment... so I didn't.

There were some substantive Reply Comments, the most impactful of which was an eight-page submission from Amateur Radio Digital Communications (ARDC).

I recommend reading the [entire ARDC submission](#), but here are some poignant excerpts:

There are real use cases for wider bandwidths on VHF and UHF to enhance digital communications.

Commenter Jeremy Taylor has expressed a desire to have up to 1 MHz bandwidth available on the 70 centimeter band, using BPSK, QPSK and 16-QAM, 64-QAM and 256-QAM using multiple spatial streams. This bandwidth would enable data rates as high as 13.34Mbps. Furthermore, the proposed operation in a relatively quiet portion of the 70 centimeter band would have minimal impact on interference, since that portion of the band is already relatively quiet, and away from repeater operation.

We agree that the rules should be amended to allow this sort of operation. It would be extremely beneficial to our grantees, and our 44-net community, since it would provide an additional air interface for digital wireless communication. It would enable new applications beyond textual communication, such as web content, IoT and STEM experiments among students. We see this as an opportunity to enhance the use of the 44-Net network, opening up additional opportunities to our grantee community to develop new digital communications technologies, which is core to our mission.

Wideband emissions are already permitted on some UHF bands and are handled inconsistently under current rules.

The presence of wideband signals on UHF is hardly new. Analog 525 line NTSC television (5M75C3F, with 250K0F3E aural carrier) at 6MHz bandwidth is currently allowed in the UHF bands, even on lower UHF bands such as the 70 centimeter band. Voluntary band planning has provided space for these wideband emissions without impacting the other narrowband users on the band.

In addition, FCC Part 97 rules currently identify emissions and regulate their bandwidth based on the intended payload. This would mean that a data stream of video, such as from a webcam or live video stream, would apparently be permitted as an image emission, and can have up to 6 MHz bandwidth. A data emission carrying text or non-video binary data such as a software program would not be allowed since it is data. However, if the sole transmission of this binary data is an image, such as a JPEG or PNG file, it seems that this emission is allowed as an image emission.

We believe that the opportunity to rectify this inconsistency by allowing amateur radio licensees the freedom to utilize wider data emission types, regardless of payload, would allow experimentation with more modern emission types and encourage experiments with newer types of digital communications. This would not change the landscape of the VHF and UHF bands since wider emissions are already allowed there.

It's brilliant of ARDC to point out that a data transmission for a webcam, *using whatever bandwidth*, is not subject to bandwidth limits under the current rules because it's transmitting an "image stream", but using that same data transmission system with an identical data rate to transmit *text or binary data* is subject to bandwidth limits under the current rules.

In [their reply comments](#), Janis Carson AB2RA seems to posit that by removing bandwidth limits from the 2 meter band (144 - 148 MHz), doing so will immediately and irrevocably cause use of New Packet Radio at its maximum data rate of 1 Mbps, which requires a 1 MHz channel, causing all manner of interference on that band.

2 Meters is a heavily used band, often used for local emergency communications. As my comments noted, there is not space for a 1 MHz version of the digital mode "New Packet Radio" on 2 meters.

(A footnote on this paragraph on New Packet Radio referenced *my* comments.)

Um, *no*. First, New Packet Radio only operates on the 70 centimeter band (420 - 450 MHz) (at least, currently). Second, AB2RA makes a classic mistake that use of any Amateur Radio frequency or band is uniform everywhere in the US, and it's *not*. That's one of the *features* of the Amateur Radio VHF / UHF bands! For example, if an Amateur Radio group in Unalaska (better known as Dutch Harbor) Alaska decided to use New Packet Radio on 2 meters, that would probably work great as there's not much use of 2 meters (at least by Amateur Radio Operators) on Unalaska Island. But doing the same in New York City is probably a bad idea. Basic reasoning ("good Amateur practice"), desire for cooperation, and the existing prohibition in the regulations against deliberate interference would quickly sort this out.

David Siddall K3ZJ explains *this basic point about Amateur Radio VHF / UHF* very well in the [ARRL's Reply Comment](#):

In contrast with HF, signals on the LF and VHF/UHF bands by-and-large are limited to line-of-sight (LOS) distances. Directional antennas on the VHF/UHF bands are much more effective at directing signals in a single direction and protecting communications in other directions. The geographic proximity of the operators also means that the operators are more likely to know each other, which enhances voluntary compliance with the rules whether mandatory, such as those of the FCC, or voluntary, such as ARRL's band plan or local agreements on usage.

I enjoyed and admired the economy of [August Treubig's Reply Comment](#):

I fully support the ARRL submission that all symbol rates and bandwidth limits be removed.

So... now we wait for the FCC to consider all of this and make their decision on removing symbol rate limits and bandwidth limits from the Amateur Radio VHF / UHF bands. *I'm cautiously optimistic*, but several advisors with knowledge of the FCC have told me “*you never know for sure how it will go.*”

To check out the Reply Comments:

- Go to [FCC's Electronic Comment Filing System](#)
- Click **Filings & Proceedings SEARCH**
- In the Proceedings field, type 16-239
- Wait a few seconds for the system to find **16-239** | Amateur Baud Rate
- Click on **16-239** | Amateur Baud Rate

It's still surprising to me that so many Amateur Radio Organizations didn't file comments in the *Further Notice for Proposed Rulemaking* on Docket 16-239 (regarding the VHF / UHF bands). That doesn't bode well. But my admiration for ARRL and ARDC doing so elevated my respect for *those two organizations* a couple of notches.

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Reimagining Amateur Radio Part 2 - Data Appliance

By Steve Stroh N8GNJ

Second in a series about how Amateur Radio could be reimagined / reconceptualized to be more relevant to younger techies in the 2020s and beyond and thus increase the numbers of Amateur Radio Operators and improve Amateur Radio's relevance to the general population.

*Part One, not very economically titled, was in **Zero Retries 0135** - Techies, Data Communications, and Experimentation with New Radio Technologies Could “Save” Amateur Radio.*

One minor frustration of writing Zero Retries is the connections that keep forming, *in my mind*, of what *is possible* within Amateur Radio, that are based on *what's actually happening* in Amateur Radio. However, the developments that I track are widely dispersed, sometimes in time. But it's hard to explain those connections and conclusions, at least expediently to get a reader “up to speed” with what *I'm* seeing as possible. (This is one area where video probably has the advantage over text to present such a subject in a narrated video, and I plan to do so, as a presentation once I've finished fleshing out all of the requisite details.)

In this installment I'll be focusing on the user hardware that I'm imagining. Future installments will include the infrastructure, and eventually the use case / imagined user experience, including the applications and software. Ultimately, the most challenging aspect of this series will be to reimagine how Amateur Radio welcomes newcomers into participating in Amateur Radio, the *human* networking dimension.

Amateur Radio Data Appliance

In my opinion, Amateur Radio needs a “data appliance”... a “black box” that integrates (ideally) the following disparate elements:

- Power supply
- Battery backup
- (Optional) solar panel
- Radio transceiver
- Modem
- Embedded computer with a minimal display for status / health / troubleshooting
- Networking required to for remote access via “household” network (not Internet)
- Most of all, cabling to interconnect all of the above

To older, experienced Amateur Radio Operators, all of the above is doable, even the cables, as a Do It Yourself project. But to new Amateur Radio Operators, the above is daunting, especially the cabling necessary to connect random item A with random item B, and having to do a “treasure hunt” for the various pieces.

With the Data Appliance I'm imaginining, add an antenna that's appropriate for the individual user's situation, and the new Amateur Radio Operator can operate Amateur Radio data modes within their apartment, condo, or home with a minimum of hassle. Sit down at the kitchen table, or the couch, with their laptop, tablet, or phone when it's convenient. The Data Appliance is tucked out of the way in a corner, perhaps even on an apartment or condo balcony with a small solar panel and antenna.

TAPR packetRadio

The desirability of a Data Appliance has been recognized practically since the beginning of the Packet Radio era, and there were a number of attempts to create a Data Appliance over the past several decades. My personal favorite of previous attempts at a Data Appliance was the retro-gorgeous [TAPR packetRadio](#) which was only a concept and mockup¹:



Image courtesy of Stand Horzepa WATLOU

In contrast to the only-a-concept TAPR packetRadio, PacComm and Kantronics both developed integrated TNC + Radio units but those products were a simple embedding of a crystal-controlled embedded radio. For example, there was no ability to change channels on the radio from a command from the TNC (but that's from memory - I could be mistaken).

TAPRN Nodes



Image courtesy of tarps.net website

[Terrestrial Amateur Packet Radio Network \(TAPRN\) nodes](#) are a great example of the “Build It Yourself” (from copious documentation) approach. All the elements of a Data Appliance are there, but it's a *project* to build your own node. To its credit, TAPRN makes it entirely feasible to do so - the available documentation is well-proven and updated frequently, and the core of a TAPRN node, the NinoTNC is continually evolving in capability, both in hardware and in software.

DigiPi

DigiPi v1.8



Image courtesy of Craig Lamparter KM6LYW

[DigiPi](#) is an impressive software / “some hardware” project that integrates the modem, computer, and remote access software to provide the “Operate data modes from the couch”. DigiPi doesn’t provide a unique, streamlined app such as RadioMail or VarAC (see below), but does provide the native user interface of a number of data communications applications within in a web browser (which most such apps weren’t designed to do).

Like a TAPRN node, DigiPi is only the *software and the instructions* - you cannot buy a completed / integrated DigiPi Data Appliance. With DigiPi, the radio is left to the user to figure out, which could be as simple as an inexpensive portable radio with a commonly available cable to connect it to the DigiPi, but the DigiPi has no control over the radio functions.

NW Digital Radio UDRX-440

Much closer to my ideal Data Appliance was NW Digital Radio’s [UDRX-440](#) concept:



Image courtesy of NW Digital Radio

With an integrated 25 watt radio and built-in networking, embedded computer, and configurable modem, the UDRX-440 would have been an ideal Data Appliance.

RPX-100



Image courtesy of the RPX-100 Project

Somewhat similar in scope to the UDRX-440 was the [RPX-100](#). It was² a software-defined transceiver with reasonable transmit power output (10 watts) on the 50-54 MHz, 144-148 MHz, and 440-450 MHz bands. The RPX-100 project was funded by a [grant from ARDC in 2022](#) and reportedly progressed to the point of building and testing some prototypes. The designs of the system, especially the unique (to date) radio board that took the minuscule transmit power of the integrated Software Defined Transceiver were released as open source. Another integral component of the system was an embedded computer such as the Raspberry Pi 4 (Compute Module), so the RPX-100 would be network-capable - Ethernet, Wi-Fi, and Bluetooth.

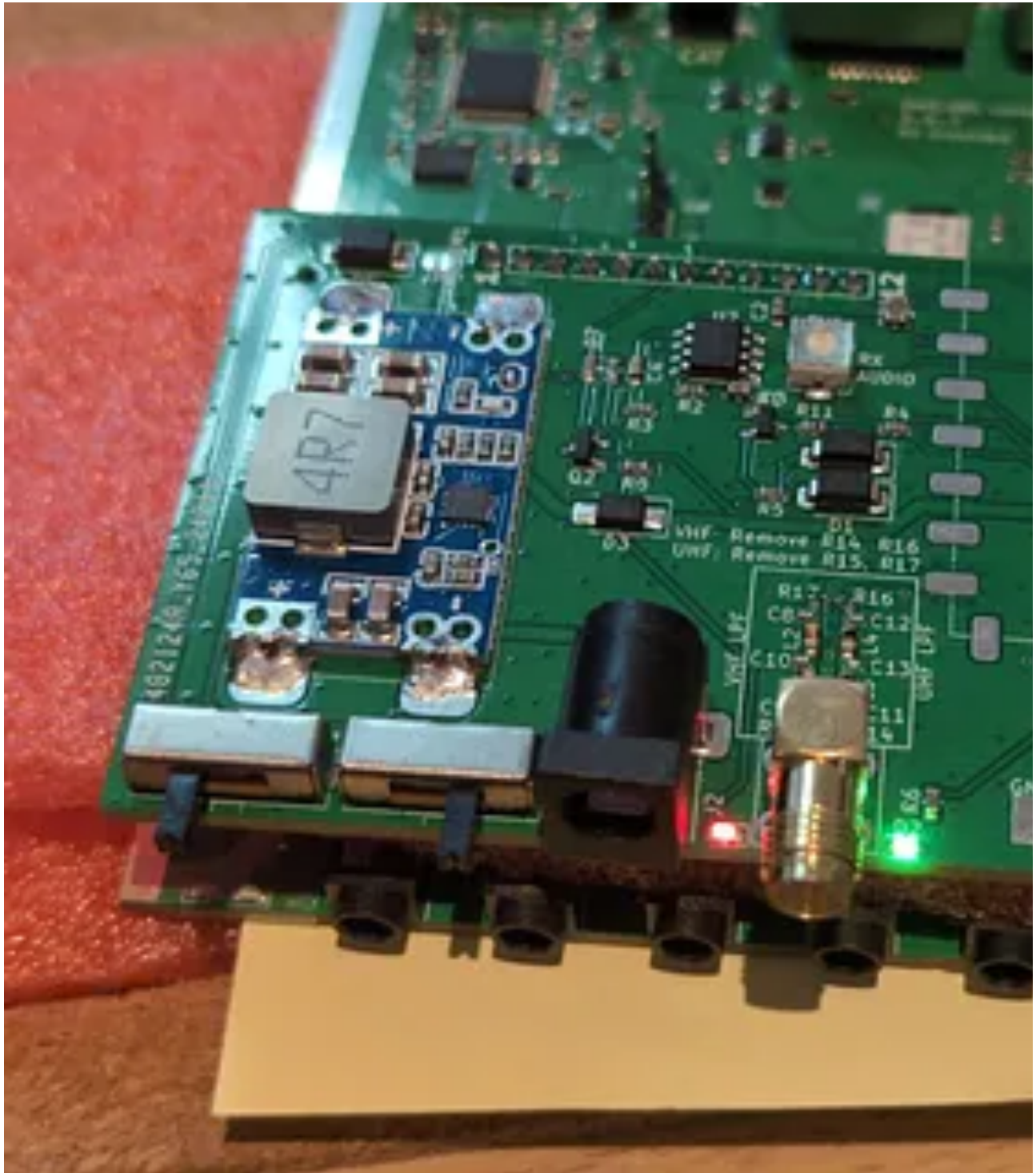
Universal Radio Controller V2



Image courtesy of Mark Herbert G1LRO

I've been following the [Universal Radio Controller V2](#) (URC V2) for some time. It's a remarkable project (more impressive that it's implemented by one person), and its capabilities are evolving very rapidly. To see some of the options available for the URC V2 such as the [APRS Digipeater & KISS Modem Personality Board](#), scroll down the main page. The initial capability of the URC V2 was as a good hardware interface between a computer and a radio, including implementing radio control via "CAT" commands for radios that are "CAT" controllable. The URC V2 does not have an integrated computer, so no networking (other than USB-C).

But, with the addition of the (in development) [VHF/UHF Transceiver Personality Board](#)...



... the URC V2 takes a giant leap towards becoming a Data Appliance, albeit at 2 watts transmit power. There is some assembly required by the user (as I read the article) that requires the user to install either a VHF or UHF radio module, and some other components. Commendably, the URC V2 information is available as open source.

FlexRadio 6xxx Series



Image courtesy of FlexRadio Systems

I'd be remiss in this discussion not to mention the [FlexRadio 6xxx](#) series of radios. Networking and remote access was built in from the beginning - front / control panels are entirely optional, so current FlexRadio units easily meet the "Operate data modes from the couch" requirement of a Data Appliance, but there are few data modes "built in" to the FlexRadio units. But the main disqualifier of the FlexRadio units is the highest frequency they offer is 54 MHz.

Icom IC-9700



The [Icom IC-9700](#) is, in several ways, a Data Appliance. It has reasonable transmit power on 144-148 MHz, 440-450 MHz, and uniquely, 1240-1300 MHz, which enables Icom's unique Digital Data (DD) mode - 128 kbps on a 100 kHz channel within 1240-1300 MHz. Other than the DD mode, like the FlexRadio units, the IC-9700 doesn't have integrated data modes. What qualifies the IC-9700 as a Data Appliance is that it has an Ethernet jack, so using the DD mode, the IC-9700 can be used remotely as a Data Appliance... but limiting it to that use case would be a waste.

PicoAPRS V4

In this modern era of embedded processors and supercomputers in our pockets, the *ultimate* example of an actual, working Data Appliance is the [PicoAPRS V4](#):



Image courtesy of Taner Schenker DB1NTO

The PicoAPRS V4 meets all of the requirements of a Data Appliance, including radio, modem, computer with display, and battery. Most importantly, it can be accessed remotely via Wi-Fi or Bluetooth. It's optimized for portability but theoretically could be used as a Data Appliance with the addition of a better antenna and external power. Unfortunately, the PicoAPRS V4's transmit power is one watt, but that's a feature not a bug considering its intended use - a portable, integrated APRS appliance.

Data Appliance from the Software Perspective

Completing the "Operate data modes from the couch" experience, the very nice [RadioMail](#) app fully supports the PicoAPRS V4.

Notably, RadioMail's developers are working on their own Data Appliance via "[varanny](#)" a software "shim" that allows RadioMail to easily access and use a VARA station (both VHF / UHF - VARA FM, and HF - VARA HF).

If you do have a VARA FM or VARA HF station, another "operate data modes from the couch" experience is the very nice [VarAC app](#) for Windows.

Summarizing - Amateur Radio Doesn't Have a (Ideal) Data Appliance - Yet

Hopefully I've illustrated in this article just how feasible an Amateur Radio Data Appliance is. All of the needed elements - radios, modems, software, etc. are present... just not all in the same unit - *yet*.

Someone... some *company*... is going to figure out that there's a market among techie Amateur Radio Operators for a Data Appliance, and they will sell *many* of them. But they will *have to get the balance of features right* - not from the perspective of "what's *cheap* enough that I can get away with foisting on this group?" but rather what's an optimum combination of *features that work*.

From my perspective, the RPX-100 was pretty close given that it had a Software Defined Transceiver and Raspberry Pi integrated into it, with reasonable transmit power on three popular VHF / UHF bands. The RPX-100 designers seemingly did the hard work of designing a RF stage and released that design as open source. If you agree, please let your favorite Amateur Radio manufacturer know *your* thoughts.

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ZR > BEACON

By Steve Stroh N8GNJ

Short mentions of Zero Retries Interesting items.

[Brief Update on APRS Foundation](#)

Jason Rausch K4APR on the aprssig mailing list (see the link for context):

The APRS Foundation is hoping to eventually gain control of aprs.org, aprs.net and any associated websites. Nothing is set in stone, as of right now. We're doing our best right now at the Foundation of organizing and preparing to (hopefully) take on all of these web assets that Bob left behind. There is a LOT of work to do, if we do gain control. We'll be looking for people to help us organize, reformat, sift through the information and put it back up on the web in a meaningful, useful format that everyone can use.

The Foundation is not ready to start accepting memberships just yet, but we're talking about a full/associate membership model that would allow people to get involved and also help support the Foundation. More to come very soon!

[ARRL Supports Youth and Especially Young Techies](#)

Kudos for ARRL for these new initiatives at their 2024 Board Meeting!

The Board approved two motions aimed at engaging young hams with a strong start to their lifelong journey with amateur radio and ARRL:

- **FREE ARRL Membership for Students.** For decades, ARRL has offered a reduced dues rate for young hams, currently priced at \$30 per year. At this meeting, the Board established a new option for a no-cost Associate membership for full-time students of age 21 and younger.
- **ARRL Student Coding Competition.** The Board approved the creation of a coding competition that will challenge students 21 and younger to design a software application that meets the specifications established by ARRL. Awards of up to a total of \$25,000 will be granted by an awards committee to the winning student(s). The terms and schedule for the competition will be determined by the committee.

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Join the *Fun* on Amateur Radio

If you're not yet licensed as an Amateur Radio Operator, and would like to join the fun by *literally having a license to experiment with radio technology*, check out

Join the Fun on Amateur Radio for some pointers.

Zero Retries Frequently Asked Questions (FAQs) — In development 2023-02.

Closing the Channel

In its mission to highlight technological innovation in Amateur Radio, promote Amateur Radio to techies as a literal license to experiment with radio technology, and make Amateur Radio more relevant to society in the 2020s and beyond, Zero Retries is published via email and web, and is available to everyone at no cost. Zero Retries is proud *not to participate* in the Amateur Radio Publishing Industrial Complex, which hides Amateur Radio content behind paywalls.

My ongoing *Thanks* to:

- Tina Stroh KD7WSF for, well, *everything!*
- **Founding Members who generously support Zero Retries financially:**
 - Founding Member 0000 - Steven Davidson K3FZT
 - Founding Member 0001 - Prefers to Remain Anonymous 01
 - Founding Member 0002 - Chris Osburn KD7DVD
 - Founding Member 0003 - Don Rotolo N2IRZ
 - Founding Member 0004 - William Arcand W1WRA
 - Founding Member 0005 - Ben Kuhn KU0HN
 - Founding Member 0006 - Todd Willey KQ4FID
 - Founding Member 0007 - Merik Karman VK2MKZ
 - Founding Member 0008 - Prefers to Remain Anonymous 14
 - Founding Member 0009 - Prefers to Remain Anonymous 19
- Numerous Annual and Monthly subscribers who also generously support Zero Retries financially!

Want to Support Zero Retries?

- The *most* effective way to support Zero Retries is to simply mention Zero Retries to your co-conspirators that are also interested in knowing more about technological innovation that is occurring in Amateur Radio and encourage them to become a fellow subscriber.
- One particularly effective method of promoting Zero Retries is to add a mention of Zero Retries to your [QRZ](#) page (or other web presence) and include a link:

<https://www.zeroretires.org>
- If you'd like to financially support Zero Retries, becoming a paid subscriber is *greatly* appreciated and helps offset expenses incurred in publishing Zero Retries. Paid subscriptions for Zero Retries are *entirely optional*, as explained in this special issue of ZR:

Zero Retries Administrivia - Activating Payment Options.

These blogs and newsletters regularly feature Zero Retries Interesting content:

- [Dan Romanchik KB6NU](#) mentions “Zero Retries Interesting” topics so regularly on his blog (that I otherwise wouldn’t know about) that I’ve bestowed on him the honorific of Pseudostaffer.
- [Jeff Davis KE9V](#) also mentions “Zero Retries Interesting” topics so regularly on his blog (that I otherwise wouldn’t know about) that I’ve bestowed on him the honorific of Pseudostaffer.
- [Amateur Radio Weekly](#) by Cale Mooth K4HCK is a weekly anthology of links to interesting Amateur Radio stories.
- [Experimental Radio News](#) by Bennet Z. Kobb AK4AV discusses (in detail) Experimental (Part 5) licenses issued by the US FCC. It’s a *must-read-now* for me!
- [RTL-SDR Blog](#) - *Excellent* coverage of Software Defined Radio units.
- [TAPR Packet Status Register](#) has been published continuously since 1982.
- Other Substack Amateur Radio newsletters recommended by Zero Retries.

These YouTube channels regularly feature Zero Retries Interesting content:

- [HB9BLA Wireless](#) by Andreas Spiess HB9BLA
- [KM6LYW Radio](#) by Craig Lamparter KM6LYW (home of the [DigiPi project](#))
- [Modern Ham](#) by Billy Penley KN4MKB
- [Tech Minds](#) by Matthew Miller M0DQW

Zero Retries is currently using the [Substack email publishing platform](#) to publish Zero Retries. It’s particularly suitable for small newsletters as you can get started for no cost.

If you’re reading this issue on the web and you’d like to see Zero Retries in your email Inbox every Friday afternoon, just click below to join **1200+** other subscribers:

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Leave a comment

If you’re a fellow smart person that uses **RSS**, there *is* an **RSS feed for Zero Retries**.

Zero Retries (N8GNJ) is on Mastodon — n8gnj@mastodon.radio — just click:

[Zero Retries / N8GNJ on Mastodon](#)

Email issues of Zero Retries are “instrumented” by [Substack](#) to gather basic statistics about opens, clicking links, etc.

More bits from Steve Stroh N8GNJ:

- [SuperPacket blog](#) — *Discussing new generations of Amateur Radio Data Communications — beyond Packet Radio (a precursor to Zero Retries)*
- [N8GNJ blog](#) — *Amateur Radio Station N8GNJ and the mad science experiments at N8GNJ Labs — Bellingham, Washington, USA*

Thanks for reading!

Steve Stroh N8GNJ / WRPS598 (He / Him / His)

These bits were handcrafted (by a mere human, not an Artificial Intelligence bot) in beautiful Bellingham ([The City of Subdued Excitement](#)), Washington, USA, and linked to the Internet via [Starlink Satellite Internet Access](#).

2024-01-26

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Blanket permission granted for TAPR to use any Steve Stroh content for the TAPR Packet Status Register (PSR) newsletter (I owe them from way back).

One fantasy (because I'll probably never end up doing it) project on my too-long list is to (re)create a working TAPR packetRadio with an actual radio, modem, and embedded computer with a similar size and color cabinet, and exactly that gorgeous, retro front panel.

2

I can't determine the status of the RPX-100 project - the rpx-100.net website is offline.

3

While Wi-Fi is a feature of the PicoAPRS V4, it's not clear if that's a communications option or it's only used for configuring the unit and software updates.